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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)

YUKINORI YAMAMOTO)

Application No.: 09/501,590)

Filed: February 10, 2000)

For: DECODING APPARATUS AND)
METHOD, AND STORAGE
MEDIUM STORING DECODING)
PROCESSING PROGRAM
OF THE SAME)

: Examiner: Shawn S. An

: Group Art Unit: 2613

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Commissioner for Patents
Washington, D.C. 20231

SUBMISSION OF SWORN TRANSLATION

Sir:

Further to our Amendment dated February 4, 2003, Applicant encloses hereto a

sworn translation of Japanese application 11-039582, which was filed on February 18, 1999,

from which the present application claims priority.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address given below.
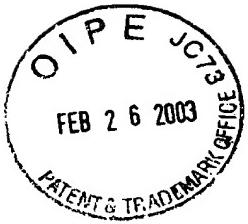
Respectfully submitted,

Peter G. Thurlow
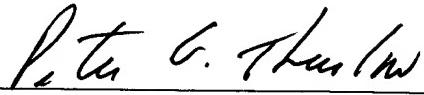
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DECLARATION

I, NOBUAKI KATO, a Japanese Patent Attorney registered No. 8512 of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 11-039582 filed on February 18, 1999 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 21st day of February, 2003

_____

NOBUAKI KATO

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy

of the following application as filed with this office.

Date of Application: February 18, 1999

Application Number: Japanese Patent Application

No. 11-039582

Applicant(s):   CANON KABUSHIKI KAISHA

March 10, 2000

Commissioner,
Patent Office   Takahiko Kondo

(Seal)
Certificate No. 2000-3015015

11-039582

[Name of the Document]	Patent Application
[Reference No.]	3686050
[Date]	February 18, 1999
[Addressed to]	Commissioner of the Patent Office

[International Classification] H04N 7/133

[Title of the Invention]	Bistream Decoding Apparatus and Method and Storage Medium
[Number of the Claims]	15

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[Indication of Official Fee]

[Prepayment Ledger No.]	010700
[Amount]	21000

[List of Filed Materials]

[Material]	Specification	1
[Material]	Drawings	1
[Material]	Abstract	1
[General Power of Attorney]	9705348	

P11-39582

[Name of the Document]   Specification

[Title of the Invention]   Bitstream   Decoding

Apparatus   and   Method   And

Storage Medium

[What is Claimed is]

[Claim 1]

A bitstream decoding apparatus for separating a bitstream encoded and multiplexed in units of plural objects into each object stream and for decoding and then synthesizing each of said object streams, characterized in that:

the precision in decoding each of said object streams can be controlled at a plurality of levels.

[Claim 2]

A bitstream decoding apparatus according to claim 1, wherein said object stream is a broadcast stream inputted via line.

[Claim 3]

A bitstream decoding apparatus according to claim 1, wherein said object stream is a stream obtained from package media including DVD.

[Claim 4]

A bitstream decoding apparatus for decoding a bitstream encoded and multiplexed in units of plural objects, comprising:

separation means for separating said multiplexed

bitstream into each object stream, decoding means for decoding said object streams respectively, and synthesis means for synthesizing each of said decoded objects,

wherein at least two decoding means, out of said decoding means, constitute one group and are each given the priority within the group, and the decoding means is arranged not to execute decoding in accordance with the order of lower priority.

[Claim 5]

A bitstream decoding apparatus according to claim 4, wherein said group is comprised of means for decoding a video object.

[Claim 6]

A bitstream decoding apparatus according to claim 4, wherein said group is comprised of means for decoding an audio object.

[Claim 7]

A bitstream decoding apparatus according to claim 4, wherein said group is comprised of means for decoding a scene description object.

[Claim 8]

A bitstream decoding apparatus according to claim 4, wherein said group is comprised of the means for decoding a video object and means corresponding thereto, for decoding an audio object.

[Claim 9]

A bitstream decoding apparatus according to claim 4, further comprising means for voiding said decoding, wherein an operation of said voiding means is controlled by an instruction via another line.

[Claim 10]

A bitstream decoding apparatus according to claim 9, further comprising an output means for outputting the fact that said voiding means for voiding the decoding is used or that said voiding means has been used to another line.

[Claim 11]

A bitstream decoding method comprising the steps of:

separating a bitstream encoded and multiplexed in units of plural objects to each object stream;

decoding said object stream; and

synthesizing each of said decoded object streams, characterized in that:

the precision in decoding each of said object streams can be controlled at a plurality of levels.

[Claim 12]

A bitstream decoding method according to claim 11, wherein said object stream is a broadcast object stream.

[Claim 13]

A bitstream decoding method according to claim 11, wherein said object stream is a stream obtained from package

media including DVD.

[Claim 14]

A storage medium which computer-readably stores a program for allowing a computer to function as means for constitute a bit stream decoding apparatus according to claims 1 to 10.

[Claim 15]

A storage medium which computer-readably stores a program for allowing a computer to execute a procedure of a bit stream decoding method according to any one of claims 11 to 13.

[Detailed Description of the Invention]

[0001]

[Field of the Industrial Utilization

The present invention relates to a bit stream decoding apparatus and method, and a storage medium and, more particularly, to an apparatus of decoding a bitstream such as coded and multiplexed image and audio signals in a digital TV reception apparatus or a digital storage medium reproduction apparatus.

[0002]

[Prior Art]

Fig. 4 shows a conventional decoding apparatus for decoding a coded bitstream. Fig. 4 shows the outline of the arrangement of a digital broadcasting receiver that has an accounting function. Referring to Fig. 4, the apparatus

comprises a bitstream input terminal 401 for receiving a coded bitstream, descrambling means 402, and separation means 403 for separating multiplexed data.

[0003]

The apparatus also has an audio signal decoding means 404 for decoding a separated audio signal, a video signal decoding means 405 for decoding a separated video signal, a communication line terminal such as a telephone line 406, MODEM 407, a CPU 408, an IC card 409, and a remote controller 410.

[0004]

The operation of the conventional digital broadcasting receiver will be described below with reference to Fig. 4. A bitstream received by a tuner (not shown) in Fig. 4 is input from the input terminal 401 to the apparatus. As the coding scheme, so-called MPEG 2 is generally used.

[0005]

In this input stream, normally, a coded audio signal and video signal are multiplexed and generally a bit stream is further scrambled in a system with a charging scheme.

[0006]

A method of charging scheme will be described later. If viewing is permitted, the stream input to the descrambling means 402 is descrambled by a descrambling key given by the CPU 408 and input to the separation means 403.

[0007]

The separation means 403 separates the stream into an audio signal stream and a video signal stream, which are supplied to the decoding means 404 and 405, respectively, decoded, and displayed on a monitor in the original forms. Control lines from the CPU 408 are connected to the audio signal decoding means 404 and video signal decoding means 405 to control stereo/multi-lingual data or display information on the screen.

[0008]

A method of charging scheme will be described. With subscription in advance to a management center via the MODEM 407, subscribed program ID and descrambling key are stored in the IC card 409. To watch the program, the CPU 408 accesses the IC card 409 to obtain necessary information. In this case, programs that are not subscribed in advance cannot be watched.

[0009]

On the other hand, there is a method in which, to watch a specific charged program, the scrambled state can be released any time and the information that the descrambling key has been used is reported to the management center via the MODEM 407.

[0010]

The latter method is a so-called pay-per-view system in which charging is later incurred in case that personal data stored in the IC card 409 and view record are transmitted

to the center.

[0011]

There is also known a viewing age limit (parental lock) function, though it has nothing to do with the charging scheme. In this function, a viewer can not watch a specific (adult) program (can not descramble) even if he has paid the charge, unless he inputs his personal identification number.

[0012]

[Problems to be Solved by the Invention]

Conventionally, however, in any schemes, viewing is limited in units of channels or in units of programs. In addition, only ON/OFF-control can be performed. For this reason, it is difficult to provide higher-quality video data in accordance with subscription or provide an interactive program.

[0013]

In recent years, large-capacity media such as DVD are becoming popular, and not only fixed control for reproduction/non-reproduction but also a variety of flexible use forms that take advantage of the large capacity are required. However, such a service is hard to realize.

[0014]

The present invention has been made in consideration of the above drawbacks, and has as its object to attain a multi-level setting of the precision of decoding a bitstream

which is coded and multiplexed in units of a plurality of objects, thereby rendering flexible and various services.
[0015]

[Means for Solving the Problems]

According to the present invention, there is provided a bitstream decoding apparatus for separating a bitstream encoded and multiplexed in units of plural objects into each object stream and for decoding and then synthesizing each of the object streams, characterized in that the precision in decoding each of the object streams can be controlled at a plurality of levels.

The bitstream decoding apparatus according to the present invention is also characterized in that the object stream is a broadcast stream inputted via line.

The bitstream decoding apparatus according to the present invention is further characterized in that the object stream is a stream obtained from package media including DVD.

Also according to the present invention, there is provided a bitstream decoding apparatus for decoding a bitstream encoded and multiplexed in units of plural objects, comprising: separation means for separating the multiplexed bitstream into each object stream, decoding means for decoding the object streams respectively, and synthesis means for synthesizing each of the decoded objects, wherein at least two decoding means, out of the decoding means,

constitute one group and are each given the priority within the group, and the decoding means is arranged not to execute decoding in accordance with the order of lower priority.

The bitstream decoding apparatus according to the present invention is also characterized in that the group is comprised of means for decoding a video object.

The bitstream decoding apparatus according to the present invention is further characterized in that the group is comprised of means for decoding an audio object.

The bitstream decoding apparatus according to the present invention is still further characterized in that the group is comprised of means for decoding a scene description object.

The bitstream decoding apparatus according to the present invention is characterized in that the group is comprised of the means for decoding a video object and means corresponding thereto, for decoding an audio object.

The bitstream decoding apparatus according to the present invention is further characterized by further comprising means for voiding the decoding, wherein an operation of the voiding means is controlled by an instruction via another line.

The bitstream decoding apparatus according to the present invention is further characterized by comprising an output means for outputting the fact that the voiding means for voiding the decoding is used or that the voiding

means has been used to another line.

[0016]

According to the present invention, there is provided a bitstream decoding method comprising the steps of: separating a bistream encoded and multiplexed in units of plural objects to each object stream; decoding the object stream; and synthesizing each of the decoded object streams, wherein the precision in decoding each of the object streams can be controlled at a plurality of levels.

The bitstream decoding apparatus according to the present invention is also characterized in that the object stream is a broadcast object stream.

The bitstream decoding apparatus according to the present invention is further characterized in that the object stream is a stream obtained from package media including DVD.

[0017]

Also according to the present invention, there is provided a storage medium which computer-readably stores a program for allowing a computer to function as means for constitute the bit stream decoding apparatus described above.

The storage medium according to the present invention is also characterized by computer-readably storing a program for allowing a computer to execute a procedure of the bit stream decoding method described above.

[0018]

[Detailed Description of the Preferred Embodiments]

In recent years, MPEG4 has received a great deal of attention as a new coding scheme. As some characteristic features of MPEG4, it has scalability in space and time, and additionally, it divides video data into a plurality of objects (e.g., background and persons), and codes and multiplexes respective data, unlike the conventional MPEG2.

[0019]

As some other characteristic features, coding corresponding to CG or animation is possible, and the error resilience is high. This embodiment places an emphasis on the processing of a plurality of objects.

[0020]

Fig. 1 is a block diagram showing the arrangement of a bitstream decoding apparatus according to this embodiment. Referring to Fig. 1, the bitstream decoding apparatus has a bitstream input terminal 101 for encoded bitstream, descrambling means 102, means 103 for separating multiplexed data, and means 104 for decoding a separated audio signal.

[0021]

The apparatus also has decoding means 105 to 107 for decoding VOP (Video Object Plane) signals, respectively, a scene description decoding means 108 for decoding a scene description, and synthesizing means 109 for synthesizing

the audio signal and VOP signals.

[0022]

The decoding apparatus also has switches 110 to 112, a priority decoder 113, a communication line terminal 114 such as a telephone line, a MODEM 115, a CPU 116, an IC card 117, and a remote controller 118, respectively.

[0023]

A multiplexed bitstream is inputted from the input terminal 101 into the bitstream decoding apparatus of this embodiment having the above-described arrangement, in the same manner as in the conventional example. Then, if viewing is permitted, the specific program is descrambled by the descrambling means 102 with a descrambling key given from the CPU 116.

[0024]

The descrambled stream is separated by the separation means 103 into streams such as audio, VOP0, VOP1, VOP2, and scene description streams. VOP is the basic unit of a video image in MPEG4 and actually represents the instantaneous value (image) of a video object.

[0025]

MPEG4 has a number of layers including an upper layer called a VOL (Video Object Layer) in which, e.g., a VOP is expanded in space or time to increase resolution, and a VO (Video Object) that is a collection of VOLs. A numerous standards can be considered for dividing one image.

[0026]

In this embodiment, a basic VOP will be exemplified for the descriptive convenience. The number of VOPs is limited to three in this example. The separated streams are decoded by the audio signal decoding means 104, VOP decoding means 105, 106 and 107, and scene description decoding means 108, and then synthesized by the synthesizing means 109 to be outputted.

[0027]

The scene description is a description using a language, which positions VOPs divided into objects in space and synchronizes them in time to obtain one video image (audio data is also regarded as one object and synchronized in time).

[0028]

The reason why not only spatial positioning but also temporal synchronization is necessary is that each object is influenced by time shift due to multiplex or variations due to decoding delay. Actually, buffers must be prepared on the input and outputs sides of each decoding means in Fig. 1, although they are omitted in Fig. 1 for the illustrative convenience.

[0029]

Referring back to Fig. 1, the switches 110, 111 and 112 determine whether VOP decoding outputs are to be output to the synthesizing means 109. When these switches are turned off, an output different from the original MPEG4 video output

is obtained.

[0030]

More specifically, when a certain switch is turned off, an object corresponding to the switch is not displayed on the screen. The switches 110, 111 and 112 are controlled by decoding an output value of the CPU 116 with the priority decoder 113.

[0031]

The priority decoder 113 functions as shown in Fig. 3. When priority decoder VOP0, 1, 2,... are assigned sequentially from an important video object in advance before coding video data, an integer value 0, 1, 2, or 3 is supplied in accordance with the subscription of the user, thereby providing a service by preparing a multiple of resolutions to one program.

[0032]

As the subscription procedures, only one extra integer value is stored in the IC card in addition to the program ID and descrambling key, as in the manner in the conventional example. In pay-per-view as well, the numerical value need only be added to viewing information to be transmitted to the management center.

[0033]

An explicit example of discrimination of the service will be described with reference to the block diagram of Fig. 2. Fig. 2 shows a specific example of the synthesizing

means 109 shown in Fig. 1. A VOP in Fig. 2 corresponds to a VOL in which the VOP is expanded to increase resolution. VOP0 is an image having the lowest resolution. If VOP1 and VOP2 are not given, an image obtained by simply expanding a subwindow in the vertical and horizontal directions is obtained as a video output.

[0034]

VOP1 or VOP2 is high-resolution image information. When VOP1 or VOP2 is supplied to the synthesizing means 109, an image with higher resolution is obtained as a video output. Hence, images of a plurality of image quality levels can be provided in units of subscription contents of users in correspondence with a common bitstream in accordance with integer values according to the subscriptions.

[0035]

The numerical values shown in Fig1. 3 will be exemplified. A user who has subscribed to "3" receives a service with the highest image quality. Referring to only Fig. 3, it appears this system can be implemented using MPEG2 hierarchical coding. However, herein the basic concept is "video object", and the resolution of only an object on the window can be changed. MPEG2 permits only hierarchical coding targeting the entire picture.

[0036]

A supplementary explanation will be done below in association with this embodiment. In this embodiment, the

priority of VOPs is determined using integer values. Instead, command mnemonic or the like may be used. Alternatively, the current level may be stored, and the level may be changed by an UP/DOWN command.

[0037]

In this embodiment, the integer values coincide with the number of VOPs to be decoded. Since the number of VOPs always varies, a ratio to the maximum allowable number of VOPs (e.g., 50% decoding or 20% decoding) may be used as an index.

[0038]

Referring to Fig. 1, the switches 110, 111 and 112 are controlled to determine the priority of the VOPs. However, the VOP decoding circuits 105, 106 and 107 may be controlled to inhibit that decoding is performed selectively.

[0039]

Instead of using the priority decoder 113, direct control may be done by the CPU 116 (decoding by software). In this embodiment, audio objects have not been mentioned. For example, for an application in which a plurality of audio data are multiplexed in a one-to-one correspondence with VOPs, processing for VOPs in this embodiment can be applied.

[0040]

When this embodiment is applied while multiplexing a plurality of scene descriptions, a service with a more flexible hierarchical structure can be provided as compared

to this embodiment in which priority is given to VOPs. In this embodiment, the description has been made assuming broadcasting. However, this embodiment can also be applied to package media such as a DVD.

[0041]

This embodiment can also be applied to an interactive (bidirectional) application such as a quiz program because ON/OFF control and other control can be performed in units of objects.

[0042]

[Other Embodiments of the Present Invention]

The present invention may be applied to a system constituted by a plurality of devices (e.g., a host computer, an interface device, reader, or printer) or an apparatus comprising a single device.

[0043]

The present invention also incorporates an arrangement in which various devices are operated such that the function of the embodiment is realized by supplying software program codes for realizing the function of the above embodiment to the computer in the apparatus or system connected to the various devices, and causing the various devices to operate in accordance with the program stored in the computer (CPU or MPU) of the system or apparatus.

[0044]

In this case, the software program codes realize

the function of the above-described embodiment by themselves, and the program codes or means for supplying the program codes to the computer, e.g., a storage medium storing the program codes constitute the present invention. As a storage medium storing the program codes, a floppy disk, a hard disk, an optical disk, a magnetooptical disk, a CD-ROM, a magnetic tape, a nonvolatile memory card, a ROM, or the like can be used.

[0045]

The function of the above-described embodiment is realized not only when the supplied program codes are executed by the computer but also when the OS (Operating System) running on the computer realizes the function of the above embodiment in collaboration with those program codes.

[0046]

The present invention also incorporates an arrangement in which the function of the above-described embodiments is realized when the supplied program codes are written in the memory of a function expansion board inserted into the computer or a function expansion unit connected to the computer, and the CPU of the function expansion board or function expansion unit performs part or all of actual processing on the basis of the instructions of the program codes.

[0047]

[Effect of the Invention]

As described above, according to the present invention, the precision when a bitstream coded and multiplexed in units of a plurality of objects is separated into object streams and decoded can be controlled to a plurality of levels. For this reason, a variety of flexible services can be realized for an input bitstream. For example, in a broadcasting medium, viewing can be conventionally limited in units of channels or in units of programs. In addition, only ON/OFF control can be performed. However, a high-quality image can be provided in accordance with the subscription even for one program.

[0048]

In addition, according to another characteristic of the present invention, additional circuits or additional software for priority assignment can be minimized. When priority is given to VOPs on the coding side, any large failure can be avoided even in an apparatus having a low ability and capable of decoding only two VOPs on the receiving side.

[Brief Description of the Drawings]

[Figure 1]

A block diagram showing an arrangement of a bitstream decoding apparatus according to an embodiment of the present invention.

[Figure 2]

A block diagram showing details of a synthesization block in Fig. 1.

[Figure 3]

Views for explaining the operation of a priority decoder.

[Figure 4]

A block diagram showing an arrangement of a conventional bitstream decoding apparatus.

[Description of Reference Numerals or Symbols]

101 … stream input terminal

102 … descrambling means

103 … separation means

104 … audio signal decoding means

105, 106, 107 … vidio signal (or VOP) decoding means

108 … scene description decoding means

109 … synthesizing means

110, 111, 112 … switches

113 … priority decoder

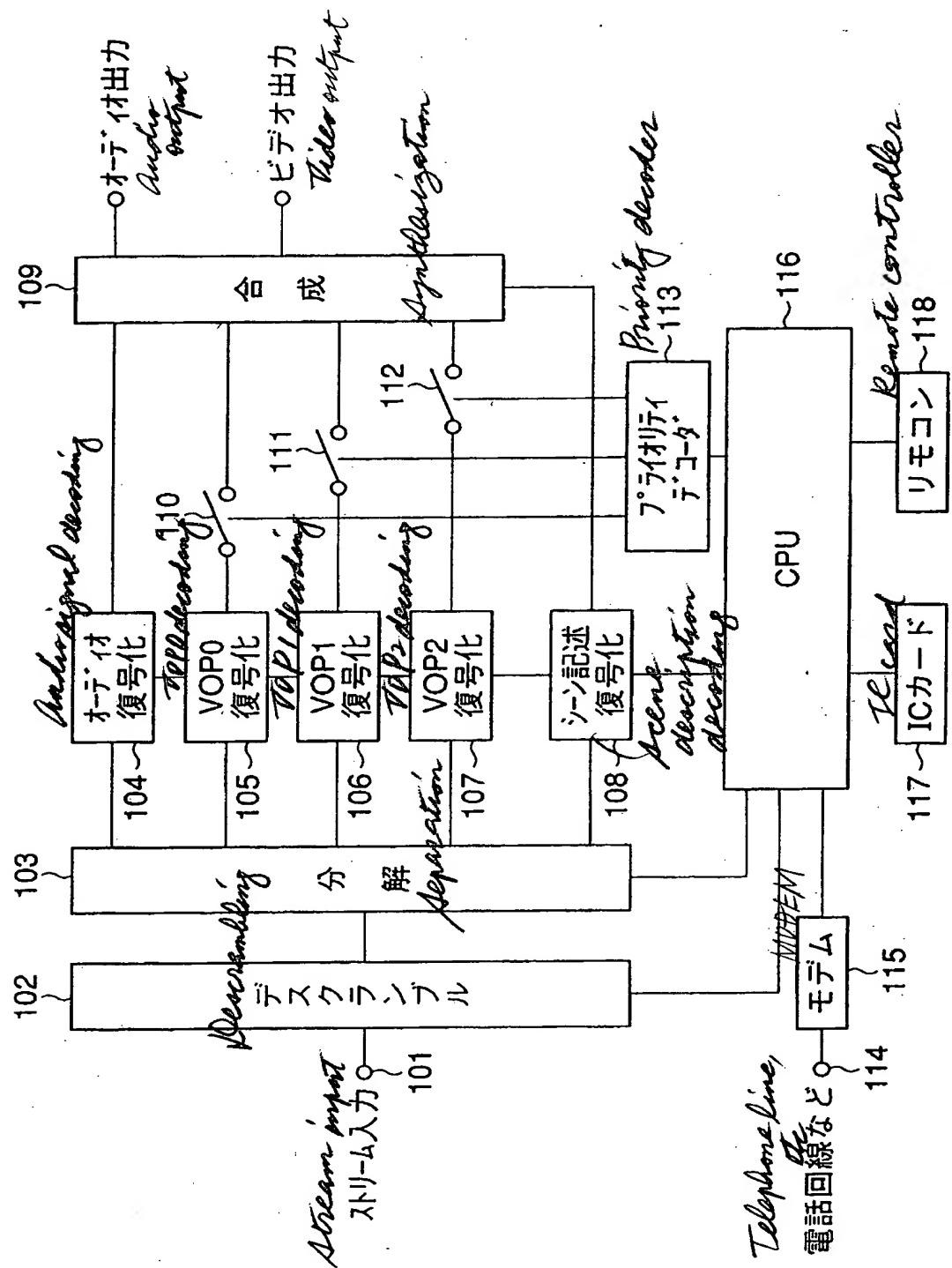114 … communication line such as telephone line

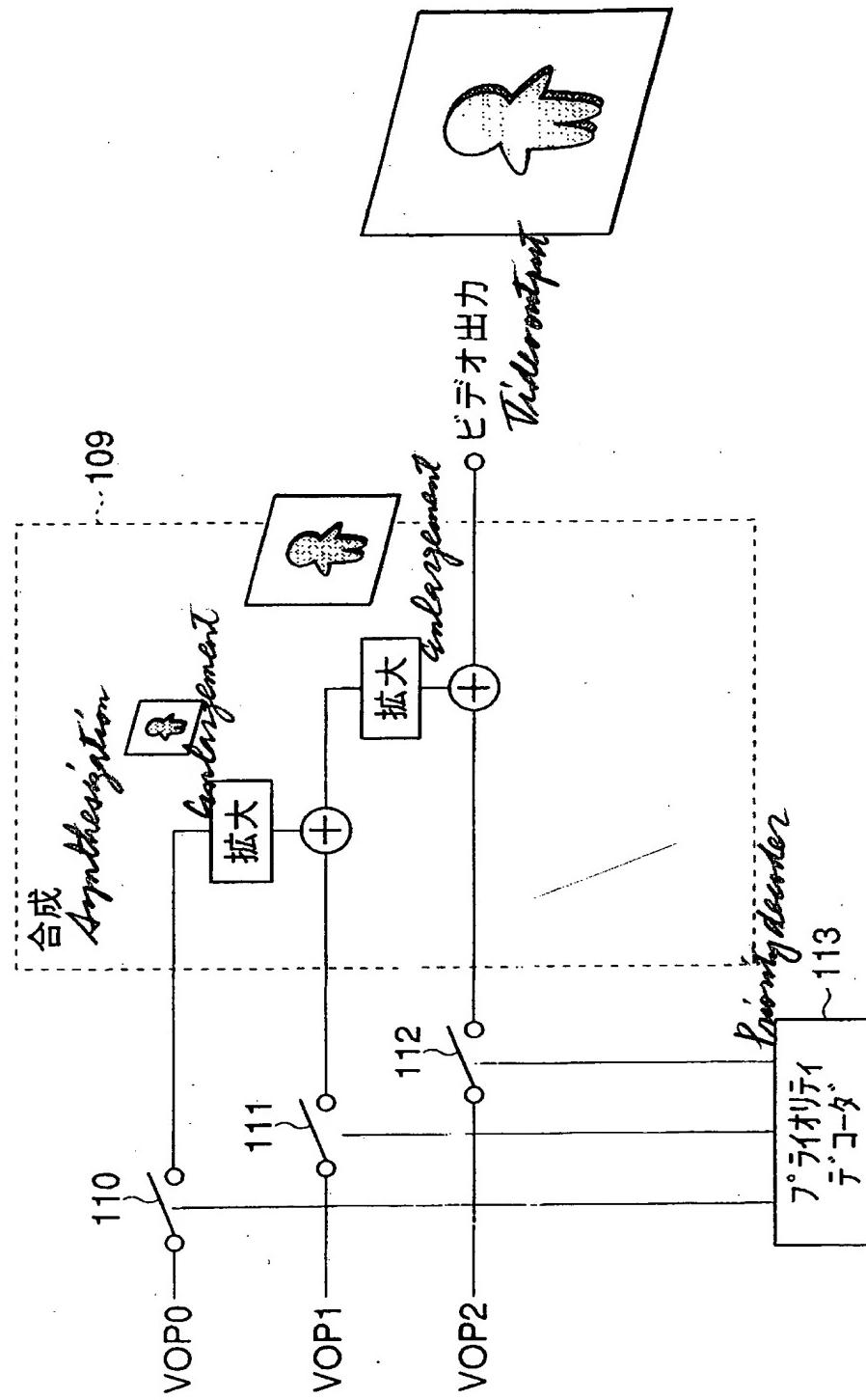115 … MODEM

116 … CPU

117 … IC card

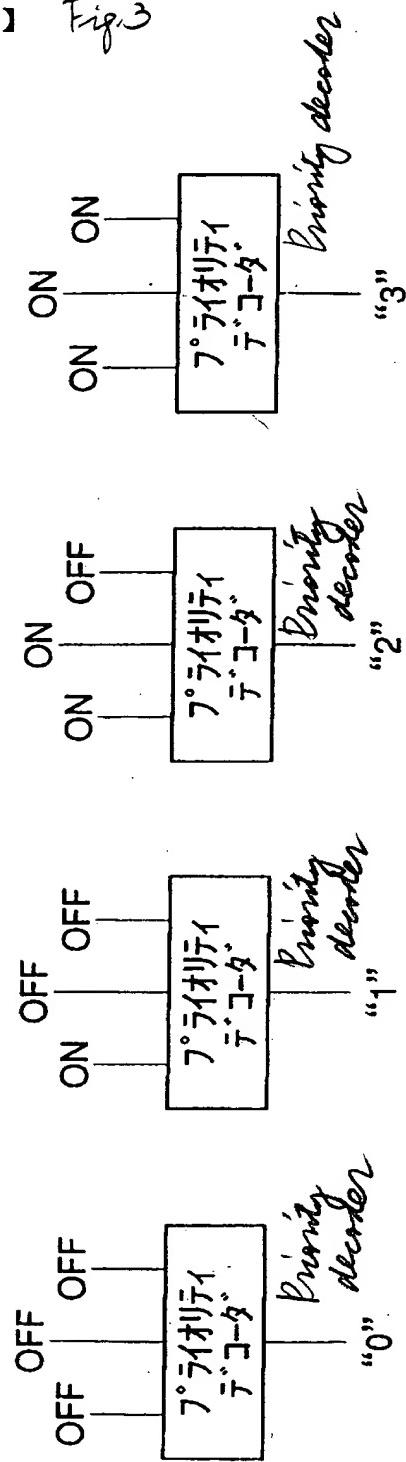118 … remote controller

【書類名】　図面　［Name of the Document］ Drawings

【図１】　Fig. 1

【図2】　Fig. 2

合成 Synthesization
拡大 Enlargement
拡大 Enlargement
ビデオ出力 Video output
109
110
111
112
113
VOP0
VOP1
VOP2
プライオリティ デコーダ Priority decoder

【図３】　Fig.3

【図４】 Fig. 4

図4のブロック図：
- 401 ストリーム入力 Stream input
- 402 デスクランブル Descrambling
- 403 分解 Separation
- 404 オーディオ復号化 Audio signal decoding → オーディオ出力 Audio output
- 405 ビデオ復号化 Video signal decoding → ビデオ出力 Video output
- 406 電話回線など Telephone line, etc.
- 407 モデム MODEM
- 408 CPU
- 409 ICカード IC card
- 410 リモコン Remote controller
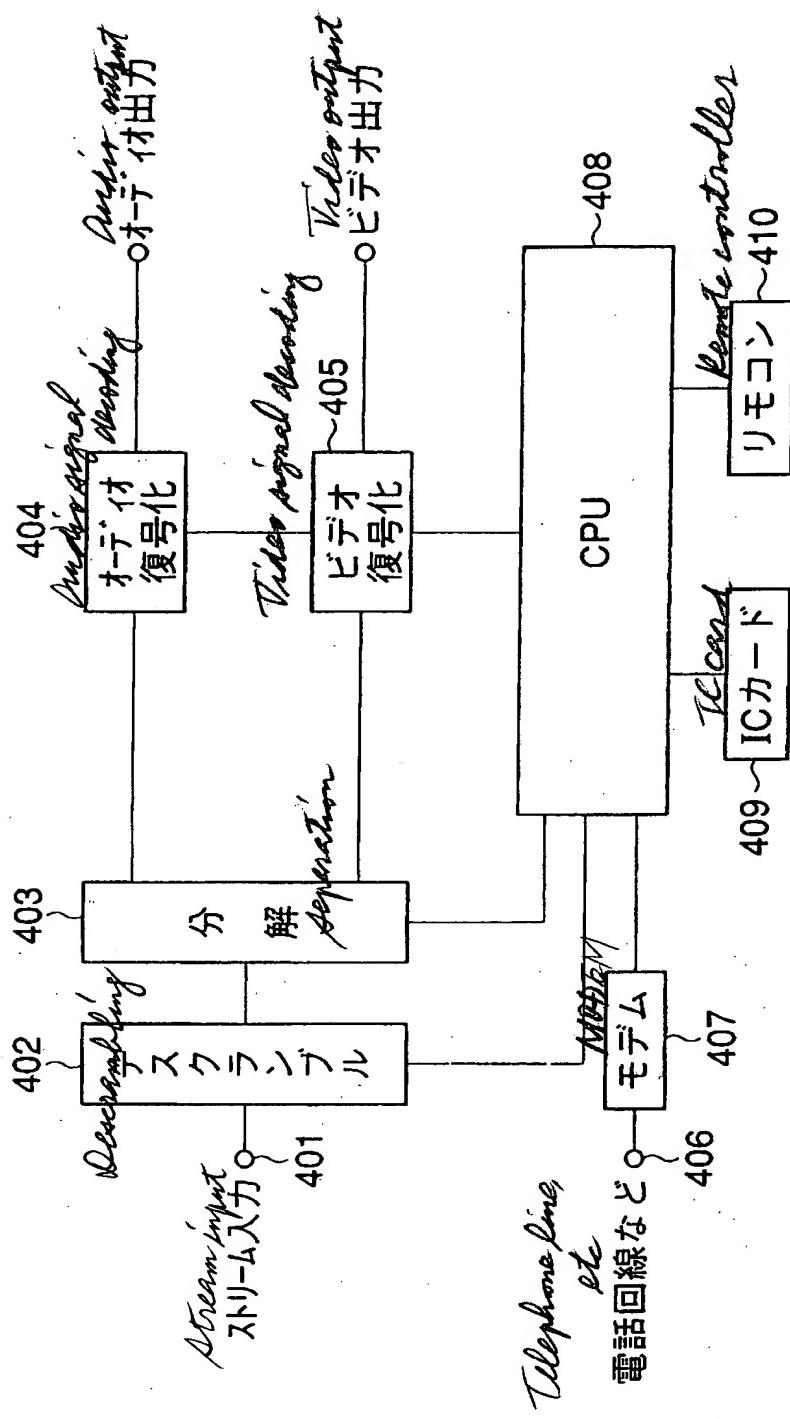
[Name of the Document]   Abstract

[Abstract]

[Object]

An object of the present invention is to permit to set a multi-level setting of the precision in decoding a bitstream, so as to render flexible and various services.

[Means for Achieving the Object]

According to the present invention, bistream encoded and multiplexed in units of plural objects is separated into each object stream and the precision with which each object stream is decoded and then synthesized is made controllable to a plurality of levels, so that it is rendered possible to decode the inputted bitstream with the precision in a plurality of levels to meet the needs thereof and to output the same.

[Elected Drawing]

Figure 1

11-039582

Applicant's Information

Identification No.   [000001007]

1.   Date of Change   August 30, 1990
       [Reason for Change]   New Registration
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                                 Ohta-ku, Tokyo
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